

4/16 Aim: Angle bisector theorem
 Do now: Get calculator
 Do the opening exercise
 Homework: TBA

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1. Using the two similar squares below answer the following questions and leave your ratio in simplest form:

a) What is the ratio of the sides? $2:5$

b) What is the area of square ABCD? $2 \cdot 2 = 4$

c) What is the area of square A'B'C'D'? $5 \cdot 5 = 25$

d) What is the ratio of the areas? $4:25$

e) What is the perimeter of square ABCD? 8

f) What is the perimeter of square A'B'C'D'? 20

g) What is the ratio of the perimeters? $\frac{8}{20} = \frac{2}{5}$

h) What is the volume of the small cube? $2 \cdot 2 \cdot 2 = 8$

i) What is the volume of the large cube? $5 \cdot 5 \cdot 5 = 125$

k) What is the ratio of the volumes? $\frac{8}{125}$

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2. Using the two similar triangles below answer the following questions and leave your ratio in simplest form:

a) What is the ratio of the sides? $\frac{1}{3}$

b) What is the area of triangle ABC? $\frac{3 \cdot 4}{2} = 6$

c) What is the area of triangle DEF? $\frac{9 \cdot 12}{2} = 54$

d) What is the ratio of the areas? $\frac{6}{54} = \frac{1}{9}$

e) What is the perimeter of ABC? 12

f) What is the perimeter of A'B'C'? 36

g) What is the ratio of the perimeters? $\frac{1}{3}$ or $1:3$

$A = \frac{1}{2}bh$ or $\frac{bh}{2}$

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CONCLUSION!!

** For all polygons the ratio of the perimeters is equal to _____
the ratio of the sides

** For all polygons the ratio of the areas is equal to _____
(ratio of the sides)²

** For all polygons the ratio of the volumes is equal to _____
(ratio of sides)³

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1. If the ratio of the sides of two squares is 1:4, what is the ratio of the areas of the two squares?
 $(1:4)^2 = 1:16$

2. If the ratio of the perimeters of two regular polygons is 7:9, what is the ratio of the sides of the regular polygon?
 $7:9$

3. If the ratio of the areas of two regular polygons is 49:25, what is the ratio of the perimeters of the two regular polygons?
 Ratio of areas $= \sqrt{\frac{49}{25}}$
 Ratio of areas $= \frac{7}{5}$
 $7:5$

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4. If the ratio of the perimeters of two rectangles is 10:12, what is the ratio of the areas of the two rectangles?
 $(10:12) = 100:144$

5. If the ratio of the sides of two similar rectangular prism is 4:7 what is the ratio of the volumes of the two prisms?
 $(\frac{4}{7})^3 = \frac{64}{343}$

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Opening Exercise

a. What is an angle bisector?
 Divide an angle into two congruent angles

b. Describe the angle relationships formed when parallel lines are cut by a transversal.
 \parallel alt. int. \cong s
 \parallel alt. ext. \cong s
 \parallel Corresponding \cong s

c. What are the properties of an isosceles triangle?
 Legs \cong
 Base \cong s are \cong

* The bisector of an angle of a Δ splits the opp. side into segments that have the same ratio as the adjacent side

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https://www.youtube.com/watch?v=PIY3e_-9JUA

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Discussion:
 In the diagram below, the angle bisector of $\angle A$ in triangle ABC meets side BC at point D. Does the angle bisector create any observable relationships with respect to the side lengths of the triangle?

$\frac{6}{12} = \frac{4}{12}$
 $\frac{1}{2} = \frac{1}{2}$

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1. The sides of a triangle are 8, 12, and 15. An angle bisector meets the side of length 15. Find the lengths x and y . Explain how you arrived at your answers.

$\frac{8}{12} = \frac{6}{9}$
 $\frac{8}{12} = \frac{2}{3}$

~~$\frac{8}{x} = \frac{12}{15-x}$~~

$$12x = 8(15-x)$$

$$12x = 120 - 8x$$

$$+ 8x \quad + 8x$$

$$20x = 120$$

$$\frac{20x}{20} = \frac{120}{20}$$

$$x = 6$$

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2. The sides of a triangle are 8, 12, and 15. An angle bisector meets the side of length 12. Find the lengths x and y .

$\frac{15}{12-x} = \frac{8}{x}$
 $15x = 8(12-x)$
 $15x = 96 - 8x$
 $+ 8x \quad + 8x$

 $23x = 96$
 $x \approx 4.2$

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3. The sides of a triangle are 8, 12, and 15. An angle bisector meets the side of length 8. Find the lengths x and y .

$\frac{15}{8-x} = \frac{12}{x}$
 $15x = 12(8-x)$
 $15x = 96 - 12x$
 $+ 12x \quad + 12x$

 $27x = 96$
 $x \approx 3.6$

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4. The angle bisector of an angle splits the opposite side of a triangle into lengths 5 and 6. The perimeter of the triangle is 33. Find the lengths of the other two sides.

$\frac{x}{5} = \frac{22-x}{6}$
 $6x = 110 - 5x$
 $11x = 110$
 $x = 10$

$x = 10$
 $y = 12$

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problem set

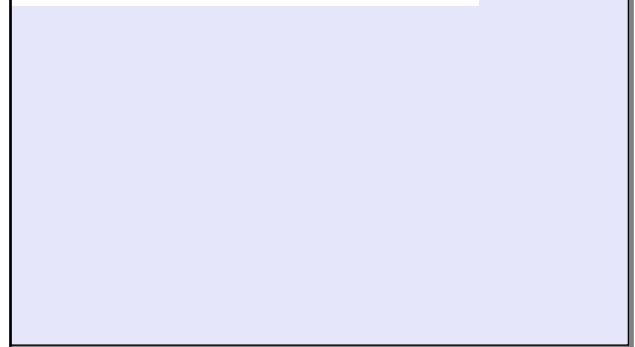
1. The sides of a triangle have lengths of 5, 8, and $6\frac{1}{2}$. An angle bisector meets the side of length $6\frac{1}{2}$. Find the lengths x and y .

$\frac{8}{6.5-x} = \frac{y}{x}$
 $8x = 32.5 - 5x$
 $13x = 32.5$
 $x = 2.5$

$y = 4$
 $x = 2.5$

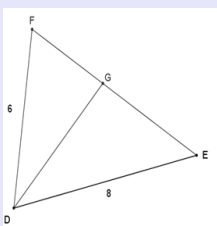
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2. The sides of a triangle are $10\frac{1}{2}$, $16\frac{1}{2}$, and 9. An angle bisector meets the side of length 9. Find the lengths x and y .



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3. In the diagram of triangle DEF below, DG is an angle bisector, $DE = 8$, $DF = 6$, and $EF = 8\frac{1}{6}$. Find FG and EG .



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